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Resonant configuration topology exploration for inductive link power transfer (Article)

Hafiz, S.[a], Zaharudin, Z.[a], Khan, S.[a], Midi, N.S.B.[a], Hwang, J.T.T.[b], Kadir, K.A.[b], Shah, J.A.[b]

[a]Department Electrical and Computer Engineering, International Islamic University Malaysia, Jalan Gombak, Kuala Lumpur, Malaysia
[b]Faculty of Engineering, UCSI University, Kuala Lumpur, Malaysia

Abstract

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This paper investigates the performance of circuit topology used in wireless power applications to optimize the level of maximum efficiency. We analyse the series and the parallel resonant topologies for use in an inductive coupling link to derive power transfer efficiency expressions verified using MATLAB. We look into the two topologies into the link under resonant conditions for selectively supplying the device with power. The results are obtained analytically which are verified subsequently by MATLAB simulation. We then analyse the links to see how maximum power transfer efficiency for a given pair of coils can be achieved. The topology at a given tuning frequency is used for powering a selected resistive load. The method is presented using a given pair of coils simulated and the results agree well with the theoretical explanation and derivations.

Author keywords

Frequency operation | Power efficiency | Topology | Wireless power

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References (28)

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1 Arshad, A., Ngah, N.A.B.A., Khan, S.
Characterization of inductive changes by resonant circuit technique

(2014) *2014 IEEE International Conference on Smart Instrumentation, Measurement and Applications, ICSIMA 2014*, art. no. 7047436. Cited 2 times.
ISBN: 978-147998041-3
doi: 10.1109/ICSIMA.2014.7047436

View at Publisher

2 Khan, I.M., Khan, S., Khalifa, O.O.
Wireless transfer of power to low power implanted biomedical devices: Coil design considerations
(2012) *IEEE Conference on Instrumentation and Measurement Technology Conference (I2MTC)*, pp. 1-5. Cited 6 times.

3 Habib, M.S., Rahman, M.M., Arshad, A., Khan, S.
Analysis of power transfer efficiency of inductive coupled telemetry system for wireless power transfer

(2015) *Proceedings - 5th International Conference on Computer and Communication Engineering: Emerging Technologies via Comp-Unication Convergence, ICCCE 2014*, art. no. 7031593, pp. 32-35. Cited 2 times.
ISBN: 978-147997635-5
doi: 10.1109/ICCCE.2014.22

View at Publisher

4 Jegadeesan, R., Guo, Y.-X.
Topology selection and efficiency improvement of inductive power links

(2012) *IEEE Transactions on Antennas and Propagation*, 60 (10), art. no. 6236050, pp. 4846-4854. Cited 59 times.
doi: 10.1109/TAP.2012.2207325

View at Publisher

5 Huh, J., Lee, S.W., Lee, W.Y., Cho, G.H., Rim, C.T.
Narrow-width inductive power transfer system for online electrical vehicles

(2011) *IEEE Transactions on Power Electronics*, 26 (12), art. no. 5936123, pp. 3666-3679. Cited 299 times.
doi: 10.1109/TPEL.2011.2160972

View at Publisher

6 Budhia, M., Covic, G.A., Boys, J.T.
Design and optimization of circular magnetic structures for lumped inductive power transfer systems

(2011) *IEEE Transactions on Power Electronics*, 26 (11), art. no. 5752254, pp. 3096-3108. Cited 371 times.
doi: 10.1109/TPEL.2011.2143730

View at Publisher

7 Wu, H.H., Covic, G.A., Boys, J.T., Robertson, D.J.
A series-tuned inductive-power-transfer pickup with a controllable AC-voltage output

(2011) *IEEE Transactions on Power Electronics*, 26 (1), art. no. 5482126, pp. 98-109. Cited 101 times.
doi: 10.1109/TPEL.2010.2052069

View at Publisher